while sometimes such English words as "insect," "spider," "scorpion" will be in one form of type, and sometimes in another. These are trifles, but still they are worth attending to, and they do not detract from the general merit of this translation, which we would freely place in the hand of any student.

Bosnien, Land und Leute. By Adolf Strausz. 2 vols. (Vienna, 1882-4.)

AFTER the occupation of Bosnia and Herzegovina by Austria in 1878, the want of an authoritative and comprehensive treatise on those hitherto neglected provinces of European Turkey soon became manifest. This want is fully supplied by the present work, on which the author has been engaged for the last four years, and for the composition of which he has qualified himself by repeated visits to the region he has undertaken to describe. The first volume, issued two years ago, is mainly historical and ethnographic, and embodies a complete history of the country, from the arrival of the Slavs in the fifth century, down to the Austrian occupation in 1878. Special sections are devoted to the various ethnical elements, Mohammedan and Christian Bosnians, Jews, Albanians, Zinzars, and Gypsies. These are all adequately treated, except the Zinzars (Macedo-Roumanians or Kutzo-Vlacks), the account of whom is confusing and even contradictory. The author seems unaware that their true relations to the surrounding populations, and especially to the Roumanians, now settled in Moldavia and Wallachia, north of the Danube, have been placed in a clear light by the recent investigations, especially of Roesler and P. Hunfalvy. The volume concludes with a series of social sketches, in which the habits and customs, legends, traditions, religions, national aspirations of the people are ably dealt with. The second volume, whose publication was delayed by various causes till the present year, is perhaps the more important of the two. It contains a complete description of the provinces, their geographical features, climate, fauna, flora, natural and industrial resources, administration, present condition and future prospects. On all these points the author speaks with great authority, and brings together a vast amount of information at first hand. Although bitterly opposed to the Austrian occupation, he believes that the inhabitants will eventually acquiesce in a step which political considerations had in any case rendered inevitable. The area of the country is given at about 52,000 square kilometres, an estimate based on recent but still incomplete surveys. The population, given by the Salname of 1877 at 2,047,000, was reduced by the census of 1879 to 1,158,000, of whom 448,000 were Mohammedans, 496,000 Orthodox Greeks, 209,000 Roman Catholics of the Latin rite, and 3400 Jews. The work unfortunately appears without either map or index, for which two meagre tables of contents are poor compensation.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.*]

The Solar Corona and After-Glow

THE inclosed extract from a letter from the Rev. A. W. Heyde, resident at Kailang in Lahoul, a hill state in the North-West Himalaya (N. lat. 32° 34′ 10″, E. long. 77° 4′ 10″), 10,000 feet above sea-level, gives an interesting notice of the solar corona and after-glow, and affords some reason for the inference that the conditions producing these appearances have been persistent, although they may not have been observed in the cloudier and more hazy atmosphere over the plains of India. Mr. Heyde's letter is dated November 3:—

"The corona round the sun has been visible since my last letter to you in July, whenever the sky was clear. It was not always equally distinct, but never entirely absent. It is beautifully distinct to-day. The same has been the case with the after-glow, which no doubt results from [the same conditions as] the corona."

The following extract from the same letter is also of interest:—

"I think I have mentioned already, in former letters to you, that since about twelve or fifteen years the latter half of August and the whole of September and October have become very unsettled as regards the weather, rain or snow occurring now often during these months, which, as a rule formerly, were a time of fine, clear weather. These untimely precipitations interfere very unpleasantly with the haymaking and harvesting in the valley now nearly every year, of which many complaints are heard. . . . A similar experience is made in Ladak and other parts of the Western Himalayas. Officers who took part in the triangulation of Ladak during the four or five seasons between 1860 and 1870 say they never could have done their work if at that time the sky over Ladak had always been so cloudy, and the high ranges so frequently enveloped in clouds, as is now the case."

In corroboration of this last remark I may mention that the hopes that had been entertained of obtaining a valuable series of actinometric observations at Leh, for which purpose two trained observers were deputed to that station rather more than a twelvemonth ago, have been so far grievously disappointed. The atmosphere of Leh was believed, on the reiterated assurance of former residents, to be remarkable for its clearness and freedom from cloud and haze. From the actinometric registers received during the past year, and the notes which accompany them, this appears to be very far from the case.

HENRY F. BLANFORD

Meteorological Office, India, 4, Middleton Row, Calcutta,
November 21, 1884

Flying-Fish do not Fly

FLYING-FISH *are incapable of flying* for the simple reason that the muscles of their pectoral fins are not large enough to bear the weight of their body aloft in the air. The pectoral muscles of birds depressing their wings weigh, on an average, $\frac{1}{6}$ of the total weight of the body, the pectoral muscles of bats $\frac{1}{13}$, the muscles of the pectoral fins of flying-fish only $\frac{1}{32}$. The impulse to which flying-fish owe their long shooting passage through the air is delivered, while they are still in the water, by the powerful masses of muscle on both sides of their body, which are of much greater breadth than in the case of the herring or any other fish of their own size.

The "flickering of the fins," which Dr. John Rae (NATURE, December 4, p. 102), like many others before him, takes for a rapid muscular movement of the pectoral fins, is only a vibration of their elastic membrane, and is to be referred to the same laws as those which govern the flapping of a tight-set sail when a ship under a stiff breeze is driving close to the wind. The flapping or vibration at once springs up whenever the sail gets parallel to the wind.

The more rapidly a flying-fish darts out of the water, the greater is the momentum with which the air presses on its outspread pectoral fins. Should, now, the atmospheric pressure induce these fins into a horizontal position parallel to the wind, their vibration is a necessary result. Let the outspread pectoral fins of a dead flying-fish be held horizontally before the opening of a pair of bellows, and the fins will be seen to vibrate as soon as the current of air passes under them. For full proofs of the accuracy of these propositions I beg to refer to my paper, "The Movements of Flying-Fish through the Air" (Leipzig, 1878).

Zoological Institut, Kiel, Dec. 15, 1884 K. MÖBIUS

Iridescent Clouds

IN addition to the particulars given in NATURE for December 18, 1884 (p. 148) of the brilliantly-coloured clouds, the following observations made here may be interesting. They were visible every day from the 6th to the 13th instant, except it be on the 9th, and at all times of the day, but only strikingly noticeable near sunrise and sunset. The colours did not appear

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on them when they were very far from the sun, they then being simply white. I did not see any dark ones, as described by J. E. Clark; indeed they always struck me as being very thin, merely like a nearly flat sheet. They tended to be arranged in bands like "Noah's Arks," and, while their texture was smoother than most cirrus clouds, they were more or less striated transversely. On some afternoons I noticed in many cases a feeble smoke-like prolongation, or tail, on the east side of the cloud; this had no colouring. They had thus sometimes a striking resemblance to an aurora, differing essentially, however, in their real position being horizontal, while the auroral band and rays are almost vertical. Their direction also was quite different: on the 11th at 8·15 a.m., and 13th at 3·40 p.m. I noticed that the striæ pointed to east by south. In shape they approached parallelograms apparently; really, to rectangles; sometimes they were very perfect rectangles. One of the most striking clouds was, however, a perfect right-angled triangle in form. Their motion was very slow. Some time after sunset they were so bright as to give a material amount of light, and to make the dust-circle around the sun look quite dim. They were evidently at a great height, though they looked lower than the dust-wisps. They were incapable of producing an ordinary halo.

Like Prof. C. Piazzi-Smyth, I can say that I have no recollection of seeing any clouds of the kind before. I saw nothing like them at the time of the grand sunsets last autumn, and I think he is mistaken in supposing any of the phenomena then seen were of the same character. T. W. BACKHOUSE

Sunderland, December 22, 1884

REFERRING to the letters which have appeared in these columns on the subject of "Iridescent Clouds" as seen at Edinburgh and York on the evening of December 11, a very similar phenomenon was seen at Derby at sunrise on that day, and was thus described in the *Derby Express* the same evening:—"About half an hour before sunrise the eastern half of the sky was covered with a dense pallium of cirrus cloud. About 30° above the horizon was seen what appeared to be an elongated opening in the dark grey of the cloud. Through this spindle-shaped opening the sky was of an intense emerald colour. The strangest part of the phenomenon, however, occurred shortly before eight o'clock, when the vivid green had given place to a mass of brightness comprising all the prismatic colours arranged in bands transversely, each of the primary colours shading gradually into its neighbour in the same manner as in a solar rainbow. The appearance was now not unlike a huge many-coloured eye set in a dark uniformity of cirro-stratus. As the sun arose the colouring faded, and when the solar orb was several degrees above the horizon the phenomenon remained as a patch of brightness upon a silver-grey vapour, and was somewhat similar in appearance to an imperfectly formed parhelion. Its position, however, with regard to the true sun, showed at once that the phenomenon was not of the parhelion class."

C. J. P.

THE iridescent cloud effect mentioned by your correspondents (see NATURE, p. 148) was well seen here on the 13th about 4 p.m., and was very much as described by Mr. Clark. Three distinct bands of colour were seen just at the upper edge of a dark slate-coloured cloud towards south-west, and two faint ones on the clearer sky above. I write specially to remark on the nature of the colour of these bands. They were not *prismatic* colours as mentioned by Mr. Clark, but unmistakable *interference* or residual colours, the lowest bright purplish pink, shading into green, the next the peculiar light brick red seen in Newton's rings, and a very recognisable colour, also shading into green, and the rest pink and green, of similar colour to the lowest. There can be, I think, no question that this was an interference-phenomenon, and I hope some of your correspondents may be able to give the *rationale* of it.

Fairfield House, Darlington JAMES I'ANSON

I SEE notes in NATURE, December 18, 1884 (p. 148), on iridescent clouds. I observed similar appearances on the Yorkshire Wolds, between Market Weighton and Brough, on December 6 and again on December 13, 3–4 p.m.; but instead of the clouds being totally coloured, only the edges of rifts in a thick cloud-mass were so tinged. The phenomenon was much finer on the latter date, the rift being much larger and the colours more widely dispersed at one end, so that a rose tinge occupied there the whole of the acute angle of the gap.

Broseley, Shropshire W. W. WATTS

The Rotation of Neptune

SEVERAL circumstances delayed my observation of the planet Neptune this autumn until November 24. On that and the two following nights the light of Neptune was compared with the light of the star B.A.C. 1072; and, assuming that the light of the star was steady, that of Neptune was found to undergo apparently regular variations, but much smaller than they were last year.

The observations were combined in the following manner:—The magnitude, m, at any time, t, was assumed equal to

$$m_{\circ} + k \sin n\,(t - t_{\circ}),$$

where $m_{\circ}$ was the mean magnitude at the time $t_{\circ}$, k one-half the variation between maximum and minimum, and n equal to $\frac{360^{\circ}}{7{\cdot}92}$, or 45°·45, according to the observations of Neptune last year, which gave 7·92 h. as the rotation-period. Subtracting m', the unknown magnitude of the comparison star, which is, however, of about the seventh magnitude, we have

$$m - m' = m_{\circ} - m' + k \sin n\,(t - t_{\circ})\,;$$

and by assuming approximate values, by introducing corrections, and by solving the 11 equations corresponding to the 11 observations by the method of least squares, it was found that

$$\begin{aligned} m_{\circ} - m' &= 0{\cdot}86 \\ k &= 0{\cdot}19 \\ t_{\circ} &= \text{Nov. 24d. 13·01h. G.M.T.} \end{aligned}$$

The preceding epoch of maximum will be found by subtracting 1·98h.; and similarly the following epoch of minimum will be found by adding 1·98h.

Now these observations were made without special care, and consequently the probable errors were larger than they should be in comparison with the small variation; but on the night of November 29 every care was taken to obtain accuracy in the photometric measures, and the following results were obtained:—

$$\begin{aligned} m_{\circ} - m' &= 0{\cdot}82 \\ k &= 0{\cdot}20 \\ t_{\circ} &= \text{Nov. 29d. 11·72h. G.M.T.} \end{aligned}$$

The following is the comparison of observation and computation:—

Kempshot M.T.	Diff. mag.		
1884 Nov. 29	($m - m'$)		o – C.
h. m.	Obs.	Comp.	
7 10	0·91	0·92	–0·01
8 26	1·03	1·02	+0·01
10 5	0·88	0·88	0·00
12 7	0·64	0·63	+0·01

It should perhaps be added that Kempshot is 5·19h. west of Greenwich.

By comparing the epoch on November 29 with the corresponding epoch on November 24, we find that 15 rotation-periods occupy 118·71h., so that each rotation-period is 7·914h., which may be considered identical with the period found last year. MAXWELL HALL

Jamaica, December 1, 1884

Peculiar Ice-Forms

CIRCUMSTANCES have prevented my replying earlier to Dr. Rae's letter in NATURE of November 27 (p. 81). The situation of the ice described in my letter of November 6 (p. 5) precludes the possibility of its having been a remainder from last winter's snow, since it was only some fifteen hundred feet above the valley of Chamounix, and exposed during the summer months to daily sunshine. In fact, the mid-day sun only just failed to reach it on the 17th of October.

In the *Neues Jahrbuch für Mineralogie* for 1877 (referred to by Dr. Wetterhan of Freiburg in NATURE, vol. xxi. p. 396) is an article by Dr. G. A. Koch giving an elaborate description and discussion of a very similar ice-structure, formed under very similar circumstances, which he observed on October 18, 1875, near St. Anton in the Arlberg. He also quotes other cases observed on the Wormserjoch in the Tyrol, and by Prof. Doenitz

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